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Volume 234 MAY 16, 1946 Number 20

HEALTH BILLS PENDING IN CONGRESS*

Part One

FRANZ GOLDMANN, M.D.†

NEW HAVEN, CONNECTICUT

THE fight over a national health program is on. An unprecedented number of bills for the improvement and extension of health services is pending in Congress. We may be confused by this flurry of legislative activity and may differ in our opinions about the merits of these bills. But we may be said to be at heart on the side of any program designed to adjust the health services to the rapid progress of medical science and the profound socio-economic changes that have taken place since the nineteenth century.

Naturally and inevitably, one question is immediately raised. Is there any need for a nation-wide health policy as contrasted to local development of health programs? To answer this question one must define the unmet needs.

PUBLIC-HEALTH SERVICES

There is need for the extension and strengthening of the basic public-health services. Despite creditable achievements in the development of community-wide services designed to prevent illness and promote good health, the goal is far from being reached. Full-time health units are operating in less than two thirds of all counties, and many of these are without adequate staffs and sufficient funds. The annual per capita expenditure for local health work is $0.61, whereas about $1.00 would be necessary to meet at least the most urgent requirements, and $2.00 to $2.50 to meet them all. But the problem is not only one of allotting more money; its solution also requires a reorganization of administrative structure.

Historically, the responsibility for the administration of local health services has been vested in the city, town, village or township. Many of these units are too small in population or too weak in resources to employ the necessary full-time public-health personnel. After years of study, a committee of the American Public Health Association,[1] headed by Dr. Haven Emerson, has proposed a plan whereby the 3070 counties and their contained cities in the United States can be served by 1197 units of local health administration. More than two thirds of these units would serve several counties. It is imperative to create service districts rather than to continue the administration of public-health services by small political units.

FACILITIES FOR MEDICAL CARE

There is need for more hospital beds, for better distribution of the various types of hospitals and for improvement of the quality of many facilities for medical care. In response to an ever growing demand, the number of hospital beds in this country has increased from about 35,000 in the early 1870's to 1,729,945 in 1944, or from approximately 1 bed to more than 12 beds per 1000 population, although it must be borne in mind that some 550,000 beds are in federal hospitals restricted to certain groups.

Despite and because of this great progress, we must not rest on our laurels. There are shortcomings that ought to be eliminated. The over-all bed rate falls short of present standards. According to the prevailing opinion, 4.5 beds in general hospitals are necessary for every 1000 persons, but the actual rate is below 4.0. In mental hospitals 5.6 beds would be necessary, but only 4.6 beds are available. In tuberculosis hospitals there is need for 2 beds for every death from this disease, but there are available only 1.3 beds per death from tuberculosis. Obviously, a substantial number of additional beds must be provided to meet the requirements of the time. No illusion should be entertained about the magnitude of this task.

The distribution of the existing hospitals is extremely uneven. At present, the best supplied states have about three times as many hospital beds per 1000 population as do the states with the lowest bed rates, and this inequality is even greater when only the general hospitals are considered. Hospitals are located where money is abundant and where there is enough wealth to build them and enough purchasing power to pay for their services. The wealthier states comprise about one quarter of those in the Union. The poorer parts of the country, the

*This is the first of a series of four lectures on medical sociology given at the Harvard Medical School during February and March, 1946. They were sponsored by the Department of Preventive Medicine and were primarily intended for third-year students.

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very regions undersupplied with hospital beds, have more need for modern treatment service.

Certain types of facilities are conspicuous by their rarity. This applies primarily to chronic-disease hospitals and convalescent hospitals, which are necessary for the proper and humane care of the sick as well as for the effective and economical operation of general and special hospitals.

To place emphasis on the number rather than the quality of medical-care facilities would be to ignore a fundamental of hospital policy. The hospital at its best is a superb institution. Many hospitals meet the highest standards, but many others need to be improved, and hundreds of institutions in actual operation are hospitals in name but primitive infirmaries in fact. At present, approximately two thirds of all hospital beds are in hospitals approved by the American College of Surgeons as meeting the standards considered fundamental to good hospital care, and most of them are in the large cities. It is noteworthy that the American College of Surgeons excludes hospitals with less than 25 beds from inspection and approval. According to a special survey made in 1939, nearly one third of all registered and nonregistered facilities for medical care and more than one third of such general and related hospitals had fewer than 25 beds. In 1944, it was found that nearly one fifth of the hospitals registered by the American Medical Association had less than 25 beds. The excuse for the existence of such small facilities is that many of these hospitals offer the *only* inpatient service in small communities. All the facts point to the necessity of reorientation of hospital policy to assure high standards of care throughout the country.

The shortcomings mentioned have discouraged highly skilled physicians from settling in small communities and have induced those practicing in small communities to move to large cities at the earliest possible moment. They have deprived many a country doctor of easy access to a hospital and of the opportunity for intellectual growth and technical assistance.

Since the increase and expansion of hospitals have taken place without over-all planning, governmental and nongovernmental activities in the hospital field are unco-ordinated. They duplicate each other in some communities and are entirely lacking in others. What is needed is a nation-wide hospital policy devised, accepted and carried out by all groups concerned, and concerted action rather than isolated effort.

District health centers, although they are essential to successful public-health work, have just begun to develop. At present they are intended to attain a functional and administrative co-ordination of all local health activities by housing under one roof a variety of clinics and also certain bureaus for the administration of health work within districts. In connection with the formulation of plans for an integrated hospital system, the potential value o public-health centers to broad health programs ha been the subject of much debate. It might be wi to develop the old-type district health centers int centers of both preventive health activities an medical care for the whole community by makin them the headquarters of physicians and relate groups in private practice as well as of personn employed by public and private agencies.

Distribution of Physicians

There is need for better distribution of competen physicians and members of allied professions. Th large majority of the physicians in actual practic are graduates of approved schools, but many of th older physicians have had little opportunity to d more than occasional post-graduate work. Earl in 1942, about every fifth physician reported him self as a specialist, but only about 18,000 name were listed in the *Directory of Medical Specialists*.

There is a good deal of disagreement concernin what constitutes a satisfactory ratio of physician to population. Before the war, there was one docto in active practice for every 935 persons, and thi ratio was unsurpassed by any other country. How many physicians will be needed in the future is problematical. The only experience gained relate to organized programs operating on the basis of full-time group practice. Some of these plans, rendering complete service, need one physician for 1000 persons and others one for every 1200. What is not known is the ratio of physicians to population under a broad health program operating on the basis of the individual practice of medicine. In estimating future demand, allowance must be made for full-time service by physicians in public-health work, for the administration of hospitals and clinics and medical-care programs and for special services, such as those of the Veterans Administration.

The distribution of physicians leaves much to be desired. At present, they are concentrated in densely populated areas, large urban centers and relatively rich sections of the country; they are rare, if not lacking, in thinly settled areas, small communities and relatively poor sections. As might be expected, the location of doctors in the past was primarily influenced by the purchasing power of the people in a given community and to some extent by the availability of good hospitals and social and educational advantages. Significantly, the largest number of physicians per unit of population was found in the sections of the country with the largest dollar amount of retail sales per capita. Equally significant is the fact that the accredited specialists, with negligible exceptions, are practicing in large communities with good hospitals.

Organization of Professional Services

There is need for organization of professional services according to the requirements of the time.

With the rapid advance of scientific medicine, the sum total of knowledge and skill has become so great that it cannot be mastered by any single person. The family doctor loses his patients, since people expect more than before from the physician and tend to consult a specialist without first seeing the general practitioner. Inevitably a growing number of young physicians, for one reason or another, are anxious to specialize in one of the many narrowly bounded specialties and refuse opportunities to gain experience in general practice. All too often the patient is regarded as a mere aggregation of parts, seen only through an optical instrument, and is referred from one specialist to another without receiving the services of a physician. The following story written by a British physician,[2] speaks for itself.

> The need for the general physician is illustrated in this true story of six specialists and no doctor. There was a man with inframammary pain who betook himself to a cardiologist, who suspected a spinal-cord lesion and sent him to a neurologist, who diagnosed spinal osteoarthritis and sent him to a radiologist whose x-rays revealed nothing. . . . Being still in pain he went a little later to a chest specialist who discovered nothing but suspected a psychoneurosis and sent him to a psychiatrist who refused to get to work until the man had been to a clinical pathologist who reported that all blood examinations were normal. The patient returned to the psychiatrist and was still in conference with him when last heard of.

One is therefore justified in asking whether the wheels of history are to be turned back and specialization is to be curbed, or whether the family doctor shall be strengthened by being made the link between patient and specialist. The answer is clear. Effort must be concentrated on the smooth cooperation of general practitioners and specialists, so that the general practitioner can readily be the family doctor, the specialist can complement him as he ought to, and the patient can receive the optimum in quality, efficiency and economy of service. The wide recognition of the need for a new approach to the organization of professional services explains the current interest in the development of group practice of medicine.

It is high time to proceed to sound organization of more group-practice units of different types in large cities and smaller communities, so as to gain experience about the best method of organization and the potentialities and limitations of this form of medical practice.

Extent of Medical Care

There is need for more and better treatment of disease and defects. Innumerable studies on this subject have appeared. A digest of statistical data fills a volume of more than two hundred pages.[3] The findings differ in detail but are alike in regard to the essential facts.

The extent to which medical care is actually received depends largely, although not only, on ability to pay. This is contrary to American ideals, which call for equal service to all according to need. In general, persons in the high-income brackets receive relatively much more service — and in many cases better care — than do those in the middle-income and low-income groups, although the need for service tends to increase with decreasing income. The proverbial statement that the rich and the poor receive good service is correct with respect to those of the former who have chosen their parents well and consequently do not have to worry about their sickness bills and for those of the latter residing in large cities and for those living outside large cities when they need hospitalization.

Until a few years ago there was a large group of forgotten men and women — the self-supporting persons with low and moderate incomes. It is of great significance that the picture has begun to change since the development of voluntary health-insurance plans. There is accumulating a large body of evidence showing that the removal of the economic barrier between those ready to render service and those demanding medical care eliminates much of the inequality of service so typical of earlier times. A pertinent example is afforded by the experience of Blue Cross plans. The studies of the Committee on the Costs of Medical Care,[4] based on the famous investigation by Roger I. Lee and Lewis W. Jones, arrived at the conclusion that 107 admissions per 1000 population would be necessary to provide satisfactory hospital care. Actually, the average number of admissions among the 20,000,000 persons covered by Blue Cross plans is 107 per 1000 eligible persons. It should be borne in mind that the majority of the subscribers to the Blue Cross belong to the middle-income group and before the initiation of insurance programs received only half the amount of hospital care that they now obtain. Twenty million persons constitute only a fraction of the total population, however, and the situation in general leaves much room for improvement. According to the United States Public Health Service,[5] in 1942 the civilian population of the continental United States obtained in non-federal general and allied special hospitals care equivalent to 0.92 days per person. This compares with 1.4 days believed to be necessary. In Massachusetts, the number of days of hospitalization was 1.4 per person per year, but in Mississippi it was only 0.3.

The gap between the volume of service actually received and the standards of good medical care is much greater if service outside the hospitals is considered. In 1945, about 5,000,000 persons were enrolled in voluntary prepayment plans covering physicians' services and the majority were eligible for limited service only. In many rural areas and small communities professional service is received only in emergencies. In dental care, the extraction of teeth is the service most frequently performed, and conservation of the teeth and prophylaxis play a distinctly minor role.

The question of adequacy or inadequacy of medical care has been, and still is, the subject of heated

discussions. Some medical authors have consistently denied that there is much inadequate medical care. The results of the Selective Service examinations came as a shock to those who had been doubting Thomases, but did not surprise those who had closely studied the many surveys of health conditions in various economic groups and in urban and rural areas. By April, 1945, nearly 5,000,000 male registrants, or 30 per cent of those examined, had been classified as unfit for military service. Of the young women applying to the Women's Army Corps, over one third had been rejected because of physical and mental defects. As Dr. Roger I. Lee[6] has remarked, the figures are sobering. However one interprets these data, it is certain that the health conditions of these young men and women in the prime of life are nothing to be proud of. In this connection it deserves mention that a total of 1,500,000 young men inducted with defects were readily rehabilitated for military service, and this experience clearly proves that much can be achieved by providing for more and better medical care.

What, then, are the major reasons for the existing inequality of service? Many persons go without adequate medical care because they lack the money to pay for it and are unwilling to accept charity. Some do not seek it because they are not health-conscious or prefer to rely on the drug clerk, an almanac or the advice of the old woman next door. Still others do not desire the services readily available to them, believing that they will not get their money's worth. Everyone knows that there is illness and defect for which little can be done in the light of present knowledge, but it should be realized that there is also much illness and defect for which much could be done.

Cost of Medical Care

There is need for organization of group payment for medical care. Authors writing for popular consumption often refer to "the romance of medicine." The story of the advance of medical science does read like fiction, but unfortunately there is another side to this picture; hospital bills and doctors' charges are nonfiction.

The rise of scientific medicine has greatly increased available knowledge and skill and made medical care more efficient than ever. With this, medical care has become more complex and more expensive. Profound economic and social changes have had a strong bearing on need, demand and ability to pay for all the services that modern medicine has to offer, with the result that the gap has been widening between medical science and medical practice.

The actual medical expenditures of a large fraction of the population are insufficient for adequate care, and they are ill related to the actual needs. People spend primarily on such services as are readily available and economize on those that ca not be easily obtained. They are inclined to mak certain expenditures that would not be necessar to the same extent were there a complete progra of medical care. Proportionately, medical-care ex penditures do not figure largely in the total expend itures of the average family. The patient who ha to carry the full burden of costs when they occur however, finds neither consolation nor help in th knowledge that the average costs of medical car represent a small fraction of the expenditures of a families. What matters to him is that he has to pa for the service. Medical costs are unpredictable unbudgetable and often unbearable. As the head o a family of four with a combined family income o $1800 once remarked, "If I get sick I go broke pay ing the hospital and doctors. Then I worry so tha I get sick again."

The full benefits of scientific medicine cannot b reaped unless available knowledge and skill are ap plied to all the people, and this implies the develop ment of organized payment plans designed to mak the costs of medical care predictable, budgetabl and bearable. We cannot afford not to develop or ganized payment plans, because they serve the in terests of all — the patients, the health professions the hospitals and the Nation. The average expend itures of all families and individuals for medica care are fairly constant and in recent years have con stituted 3.5 to 4.0 per cent of their incomes. Th country as a whole spends 4 per cent of the nationa income on all health services. This money, if spen wisely, can buy more and better service for all.

Disability

There is need for protection of the individual and the family against economic losses resulting from disabling illness. Serious disease brings with it not only high expenditures for professional and in stitutional services but also substantial losses in income, depletion of savings or both. As stated by a California Senate committee,[7] "Under the present system a siege of sickness brings many families to bankruptcy."

Provision of medical care alone cannot solve all the problems of the sick. Protection of the patient from want caused by reasons beyond his control is a fundamental function of any organized social order based on moral principles. Moreover, quick and thorough restoration of health can be accomplished only if the patient is able to maintain a reasonably fair standard of living during the time he is pre vented from working and earning. Provision for the financial support of those temporarily disabled by illness must go with any medical-care program if waste of money and effort is to be avoided. Pro vision for persons with long-term disability is a necessary part of a comprehensive social-security program.

Medical Research

There is need for broad and deep research in medicine, its underlying sciences and its social use. In the past, research in the cause, prevention and treatment of disease depended largely on support from endowment income, gifts and foundation grants. Powerful indeed was the influence thus exerted on medical research, and great were the accomplishments of those research workers fortunate enough to obtain some modest support for important projects. But all too often long-term fundamental research in clinical medicine and the basic sciences had to be sacrificed for short-term and fragmentary research, if not solely for confirmatory studies or barren projects. Studies of prime importance had to be discontinued prematurely because of lack of money, whereas studies of secondary importance were carried on because they were financed by earmarked funds. Preoccupied with clinical studies, most of the medical schools neglected research in the socioeconomic aspects of illness and of medicine. Institutions other than the prominent universities found it difficult to develop adequate research programs. Many gifted research workers, unable to afford the financial and personal sacrifices expected of them, left institutions of higher learning to accept positions with industrial companies or other organizations willing to give them both the opportunity to concentrate on their chosen fields and the necessary implements.

As Dr. Vannevar Bush[8] has said so well, "Further progress requires that the entire front of medicine and the underlying sciences of chemistry, physics, anatomy, biochemistry, physiology, pharmacology, bacteriology, pathology, parasitology, etc., be broadly developed." To this list one may add the socioeconomic and psychologic aspects of illness and the socioeconomic aspects of medicine.

The constant and rapid increase in the cost of medical research, coming at a time when the old sources of income are dwindling, has thrown the whole problem into sharp relief. The experience during the war has clearly shown how it can be brought closer to a satisfactory solution. It is now widely recognized that substantial support from tax funds is necessary if research in medicine, its underlying sciences and its social use is to be developed as intensively and extensively as it ought to be at the threshold of the atomic age. Intelligent cooperation is needed in establishing an adequate research program: voluntary organizations, public agencies and individuals must be brought together in the place of reliance on the isolated efforts of a few organizations and some philanthropists, and international co-operation in research must be fostered. Since the fateful day of August, 1945, on which the atomic age was ushered in, it has become clear to all but those trying to escape from reality that the development of a better social and economic order depends largely on the international cooperation of the intellectual workers and scientists. One may well paraphrase an old rallying cry by saying, "Scientists of the world, unite!" This is the banner we must hold high in the future.

Medical Education

There is need for support of undergraduate and postgraduate medical education. The future physician should be competent in health guidance as well as in the diagnosis and treatment of disease. He should also have an understanding of the socioeconomic relation of his profession and be able to participate in the formulation and operation of health programs.

Reorientation of the curriculums of medical schools along these lines is in process. The development of broad and effective teaching programs requires full-time teaching, and this means additional funds to provide the medical schools with men of high caliber who are ready to make teaching a career.

Not less important is a new policy in regard to the selection of students of medicine. At present, many promising young men and women find it difficult, if not impossible, to study medicine because they lack the money for the long period of education. The available scholarships are few. Moreover, there seem to be medical schools that restrict the number of students from certain groups. This impression was confirmed by recent events in the state of New York. In regard to adequate educational provisions for Negro students, the record is anything but unblemished.

The great upheaval of the war has brought with it a wave of enthusiasm for reinterpretation of democratic concepts. The training program of the armed services, whatever may be said against it, certainly had one excellent feature. It made it possible for qualified young men without resources of their own to study medicine. This is democratization of education, and from this principle there should be no retreat. If the individual is to be given the freest possible play for his talents, a large number of adequate scholarships must be provided for promising young men and women planning to enter the medical profession.

Democratic Ideals

The task now facing this country is gigantic. It is beyond the power and the financial resources of any individual, any single group or any single state, and requires nation-wide effort for its execution.

In reviewing the facts, repeated reference has been made to the relation of the various problems to democratic ideals. To give this presentation its proper perspective a few remarks may be added on the philosophy underlying the present movement for a national health program.

The Virginia Bill of Rights of 1776 stated that all men have certain inherent rights, namely, "the enjoyment of life and liberty, with the means of acquiring and possessing property and pursuing and obtaining happiness and safety." The Declaration of Independence, enunciating the fundamental democratic tenet that men possess the natural rights of life, liberty and the pursuit of happiness, did not go so far as the Virginia Bill of Rights. By tacit consent, however, the words of the Declaration of Independence have been interpreted as including the right to obtain health service.

With the evolution of democratic thought its individual doctrines, particularly those of equality, freedom and social justice, have assumed new meanings. Abstract objectives are being redefined and clarified in the light of the needs and potentialities of the present civilization. A growing number of statements include in the fundamental human rights the right to medical care. A report made in 1939 by a Senate subcommittee states[9]:

> The ideals and principles of American democracy call for equality of opportunity. Such equality of opportunity certainly cannot exist unless all groups in the population have access to those health services needed to prevent and cure disease, and to promote vitality and well being.

There is nobody in this country who would object to this statement. The difference of opinion arises when the methods of social action come up for discussion. Some people question the feasibility of over-all planning for health service, talking deridingly of "planomaniacs" or flatly refuse to accept any change in existing patterns. Those holding such opinions should remember Thomas Jefferson's words:

> I am not an advocate for frequent changes in laws and constitutions. But laws and institutions must go hand in hand with the progress of the human mind. As that becomes more developed, more enlightened, as new discoveries are made, new truths discovered and manners and opinions change, with the change of circumstances, institutions must advance also to keep pace with the times.

310 Cedar Street

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OSSEOUS SYPHILIS*

Report of a Case

MARK EXLEY, M.D.,† AND A. W. NEWTON, M.D.†

UNUSUAL and extensive involvement of the osseous system by syphilis occurring thirteen months after the appearance of the secondary skin manifestations is indeed of interest. It is known that wide dissemination of spirochetes through the body tissue occurs within three or four hours after the initial infection. Even though the bone, with its periosteum and blood-forming marrow cavity, contains myriads of spirochetes, skeletal involvement is comparatively rare.

Much has been written by the earliest syphilologists vividly describing the symptoms — the pathognomonic osteopathic pain and bony swelling that occur in skeletal syphilitic involvement. The case reported herein is that of a patient who suffered a spontaneous pathologic fracture.

F. B. (No. 62,490), a 26-year-old man, entered the hospital on December 28, 1942, complaining of progressively increasing pain in the right arm and both thighs of 3 weeks' duration

FIGURE 1. *Two X-Ray Films of Right Upper Arm (December, 1942).*

The humerus shows beginning bony destruction and marked periosteal elevation.

and of loss of strength, extreme weakness and general malaise. The past history revealed the usual childhood diseases. There had been no injuries or operations, and venereal disease was denied. The patient developed a rash 13 months previous to admission. His physician told him that he had a "positive blood reaction" and advised him to take treatment. The patient was unable to understand how he had contracted the disease, since he had never had a penile lesion. Additional interrogation elicited the fact that he had a negative serum reaction approximately 6 months prior to the involvement, when he had had a routine examination while seeking employment.

Physical examination revealed a poorly developed, emaciated, pale young man. The head and neck were essentially normal. The heart, lungs and abdomen were normal. There

FIGURE 2. *X-Ray Films of Lower Legs (December, 1942). There is a marked osteitis of the midportions of both tibias, with moderate periosteal elevation.*

was an irregular raised area on the surface of the midportion of the right humerus, which was tender on palpation. Tenderness could be elicited over the entire length of both femurs. There were marked thickening and irregularity and tenderness of the left tibia.

The red-cell count was 3,500,000, the hemoglobin 9.3 gm., and the white-cell count 7300. The Kahn reaction was ++++, and an Eagle test was positive.

X-ray examination on admission revealed a large area of destruction at the junction of the middle and distal thirds of the right humerus (Fig. 1). There was marked periosteal elevation, with erosion of the bone. A reaction zone was present. The left lower tibia (Fig. 2) showed marked osteitis involving the midportion of the shaft. There was definite erosion of the bones with reaction zones about them. There was moderate periosteal elevation. The femurs (Fig. 3) showed remarkable change. There was tremendous proliferation in the midportions of both bones. Definite erosion was present, and the involved areas were indistinct and had the appearance of ground glass. The clavicles were normal.

The patient absented himself without leave before further studies could be made of the skull and chest and before treatment could be instituted. He re-entered the hospital in January, 1943, but again left on the following day before

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FIGURE 3. *X-Ray Film of Thighs (December, 1942).*
Proliferative processes are present in the midportions of both femurs.

FIGURE 5. *X-Ray Film of Thighs (July, 1943).*
The lesions in the femurs show considerable advance as compared with those present seven months previously.

FIGURE 4. *X-Ray Films of Upper Arms (July, 1943).*
The right humerus shows a pathologic fracture, which occurred approximately seven months after the patient was first seen. The left humerus is essentially normal.

FIGURE 6. *X-Ray Films of Upper Arms (September, 194*
The fracture of the right humerus has healed, and after [illegible] months of treatment the eroded bone is filling in well.

any further investigation could be performed. He entered the hospital for the third time on July 24, complaining of constant pain through both thighs, the right arm and the left forearm, especially at night. He had recently fractured his right arm by bumping it against a chair. The arm thereafter became swollen and painful on movement.

Physical examination revealed a poorly nourished, chronically ill man with a marked pallor. He was depressed, uncooperative and unable to walk without aid. The pupils and fundi were normal. The heart and lungs displayed no

FIGURE 7. *X-Ray Film of Thighs (September, 1943). The lesions in both femurs are beginning to involute following therapy.*

change. The spleen was palpated on deep inspiration. The reflexes were physiologic. The skin was clear. There was no adenopathy. There was extreme tenderness with no associated sense of heat over the middle third of the right humerus. There was definite deformity of the carrying angle. The midportion of the left ulna appeared bowed and tender. Both femurs felt thickened and were moderately tender. The red-cell count was 3,340,000, the hemoglobin 9.4 gm., and the white-cell count 5800, with a normal differential. A Kahn test was ++++, and an Eagle test was positive. A test for Bence-Jones protein was negative, and the levels of blood calcium, phosphorus and phosphatase were within normal limits. The spinal fluid, including a serologic test was normal.

X-ray examination of the lungs, heart and great vessels was negative, whereas that of the skull showed numerous circumscribed areas of decalcification in the parietal and frontal bones. The ulnas showed periosteal elevation and bone destruction. The right humerus (Fig. 4) exhibited marked extension of the process since the first admission. A fracture was visualized in the midportion. The process in the left tibia had progressed slightly. The femurs (Fig. 5) showed extension of the process on the left involving the shaft up to the intertrochanteric region. The periosteum of both femurs demonstrated an onion-skin appearance, which was marked on the right.

The differential diagnosis included tuberculous osteitis, multiple myeloma, osteitis fibrosa cystica, pyogenic osteomyelitis, osteolytic metastatic carcinoma, Hodgkin's disease, leukemia, with its bony infiltration, actinomycosis and blastomycosis, but it was decided that the bony changes were syphilitic.

Specific treatment was instituted, consisting of bismuth subsalicylate every 5 days and potassium iodide. Mapharsen was given following the bismuth in gradually increasing doses once weekly. A moderately severe Jarisch–Herzheimer reaction was apparent following the first injection. The patient complained of severe pain corresponding to the areas of bone involvement, but this pain disappeared in 24 hours.

After 2 months of therapy, x-ray examination was repeated. The periosteal elevation present in the films of both ulnas on July 30 had disappeared. The bone destruction in the left ulna had persisted, but the reaction zone about the lesion had decreased. The film of the right humerus (Fig. 6) showed that the fracture had healed in good position and that the eroded bone was filling in well. The entire process in both femurs (Fig. 7) showed evidence of beginning involution. There were marked irregularity and thickening of the distal portion of the left tibia (Fig. 8).

After approximately 4 months of treatment the patient again absented himself without leave, and all attempts to contact him for further study have proved futile.

Discussion

The areas of the skeletal system most frequently involved in osseous syphilis are the cranial bones, the tibia and the shoulder girdle, especially the

FIGURE 8. *X-Ray Films of Lower Legs (September, 1943). Both tibias show considerable improvement following treatment.*

clavicle toward its medial aspect, but lesions are often observed in the ribs and the sternum.

Histologically, the lesion is usually a periostitis, but there is less tendency toward osteoplastic bone proliferation in early syphilis than during the later stages of the disease. At first, the fundamental process is one of osteolysis, with replacement of granulation tissue. Osteitis, however, is more frequent in early than in late syphilis, and it may assume a

diffuse or localized gummatous involvement. Sante[1] states that the cortex gradually develops a dense, thickened irregularity and that this is seldom attended by reaction of the periosteum. Part of the pathologic and anatomic changes due to syphilis are distinctly and characteristically gummatous. There are, however, other changes that are similar to those found in chronic inflammation of the bone produced by other causes, the distinguishing point between the two processes being the comparative mildness of the manifestations of syphilitic involvement.

Pathologic fractures are not infrequent, but in most cases they appear to be associated with neurogenic syphilis rather than with syphilitic involvement of the bone. In the present case, the cerebrospinal-fluid examination was negative. It is not surprising that pathologic fractures are relatively rare when one considers that the usual bony disease process is one of proliferation rather than of destruction. This case, however, illustrates coexisting osteogenic and osteolytic processes. The fracture described above occurred in an area of destruction.

In patients with osseous lesions the initial injection of an arsenical is often followed by an acute exacerbation of pain. The pain may last for a period of six to thirty-six hours, but the periosteal reactions rapidly subside. This is usually followed by prompt relief of all pain. Moore[2] states that if the involvement of the whole bone is present, the subsidence of the painful symptoms may be gradual, requiring a period of days or even weeks. The iodides are unquestionably an adjunct in treatment and are indicated in combination with the heavy metals during the course of treatment. Thyroid disease, tuberculosis and intolerance to iodides are the only contraindications to their use. Clinical improvement is a better criterion for effective treatment than is the serologic response. Roentgenologically, improvement or lack of improvement depends on the type of bony involvement. In the proliferative types, little if any change may be noted, even over a period of many years. In a small percentage of cases with demonstrable bone destruction, treatment causes deposition of new bone in the diseased areas. Persistence of a positive serologic reaction is of no prognostic importance and does not imply an unfavorable prognosis. Likewise, a reversal of the serum reaction to negative offers no guarantee against later relapse. The physician should not think of effecting a cure but only of arresting progress. The patient should be closely followed for twenty-four months.

Finally, the ideals to be achieved are as follows. The lesions should be healed, the symptoms relieved, relapse prevented, and the progress of the disease arrested.

Summary

An unusual case of osseous syphilis is reported, and certain aspects of the diagnosis and treatment of this disease are briefly discussed.

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CLINICAL NOTE

GENERALIZED DERMATITIS FROM PEDICULOSIS CAPITIS*

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IN a recent article, Morris[1] has called attention to pediculosis corporis as an overlooked cause of ulcers of the legs in middle-aged patients. The present paper emphasizes pediculosis capitis as an overlooked cause of a generalized dermatitis.

The usual descriptions of the dermatitis accompanying pediculosis capitis give as its location the scalp and the neighboring areas of the neck. Not infrequently, however, the eczematoid, prurigo-like dermatitis extends far beyond these limits; in some cases it involves the entire cutaneous surface, as in pediculosis corporis. The main difference is that in pediculosis corporis the patient is likely to be elderly, destitute and homeless, and the dermatitis is actually caused by the biting pediculi, followed by scratching. In pediculosis capitis, however, the patient is usually of school age or slightly older, with access to bathing and clothes-changing facilities, and the dermatitis is self-inflicted, resulting from a neurogenic pruritus originating in the skin of the scalp. One may take exception to the neurogenic explanation, however, and argue that the allergen is carried directly from the scalp to the sensitive skin by the patient's nails.

The sensation of itching noted by the examiner of a lousy scalp is a frequent experience, and one can easily imagine the feeling of the host to the pediculi. If the patient has a sensitive skin, he scratches and scrubs his skin furiously. This does not disturb the pediculi, but produces a body dermatitis that fails to respond to calamine or any other lotion and becomes progressively worse.

In most cases the diagnosis of pediculosis capitis produces a shock to the patient and his parents, and one is often told, "Never mind the nits — just take care of the sores." Treatment must be thorough, since so long as a single nit is present, the dermatitis of the scalp, neck and body will continue. As soon as delousing is complete, however, the dermatitis promptly disappears.

A dermatitis of this origin involving the entire body is found only occasionally, but it must be kept in mind, since otherwise the physician's diagnostic ability will be seriously challenged.

During the last few years I have seen several cases in which the correct diagnosis had been missed. One patient was an eighteen-year-old, married woman, apparently healthy, whose hair was swarming with pediculi (Fig. 1). Another was a fourteen-year-old girl who for over a week had been under the care of an experienced pediatrician for an unrecognized, extremely pruriginous dermatosis. She had had some fever, crying spells and anorexia. Examination revealed pediculi on the scalp, and the correct diagnoses of pediculosis capitis was easily made. There was a reasonable excuse for failure to detect the presence of pediculi, because the patient had blond hair, in which nits are difficult to identify, especially if they are few in number and are scattered over the scalp.

FIGURE 1.

The upper photograph shows the hair covered with nits and swarming with lice. The lower ones show the generalized prurigo-like dermatitis of neurogenic origin. The lice were limited to the scalp, and as soon as they and the nits were removed, the dermatitis promptly disappeared.

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The gratification of being able to make an immediate diagnosis in a case of this sort is in contrast to the discouragement experienced in cases of almost daily occurrence in which one is faced with a mysterious dermatosis or psoriasis.

SUMMARY

In pediculosis capitis, besides a dermatitis limited to the scalp and neck, one must keep in mind that not infrequently a neurogenic pruritus is present. This causes a generalized dermatitis, which is sometimes difficult to interpret.

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MEDICAL PROGRESS

NORMAL GROWTH AND DEVELOPMENT DURING ADOLESCENCE*

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ADOLESCENCE, according to Webster's first definition, is "the state or process of growing up from childhood to manhood or womanhood," and this is the meaning that will be given to the term in this review. Some confusion is apparent in the literature because a second definition by Webster limits adolescence to a much shorter terminal phase of the developmental period — that is, "the period of life between puberty and manhood."

As examples of the confusion caused by this difference of interpretation, one author refers to the "pubescent period" in girls as that preceding the menarche and the "adolescent period" as that following this event, but in another connection he refers to adolescence as "a period of rapid growth." The term "adolescent spurt of growth" so frequently used in the literature is a misnomer if adolescence begins at puberty, for it is then a preadolescent phenomenon. Another author gives the ages of onset of adolescence in a group of normal children under close observation as 7 3/12 to 13 6/12 years for girls and 10 9/12 to 13 11/12 years for boys. These ages indicate that adolescence is considered by him to include the pubescent period or to begin before puberty, in the sense in which this term is ordinarily employed. According to Webster, puberty is "the state or quality of being first capable of begetting or bearing offspring, which is marked by the maturing of the reproductive organs with the onset of menstruation in the female and the development of the secondary sex characters in both sexes; the period at which sexual maturity is reached." In the light of present knowledge this definition is not tenable, since the onset of menstruation and the attainment of the ability to bear children are far from identical. The term "puberty" is sometimes used in the literature when referring to girls as synonymous with the menarche or the time of occurrence of the first menstrual period. It is, however, oftener employed as referring to the whole period during which the secondary sex characters are developing, leading up to the menarche. It is of necessity used with a rather indefinite connotation when referring to boys, but in general it indicates the period during which the secondary sex characters are developing. To avoid confusion, the term "puberty" will not be used in this review except when direct reference is made to statements in the literature.

It is difficult to select suitable criteria for the beginning and end of adolescence, but as this review progresses it will become evident that according to the first definition, which is the one accepted here, it covers a long portion, roughly the second half, of the period of development. Adolescence begins and ends much earlier in girls than in boys and in some persons than in others, and the early and late changes indicative of the period occur gradually and are usually not readily observed. As the early indications of sexual differentiation are considered it will become evident that by certain criteria, as, for example, an appreciably increased excretion of sex hormones, an earlier age of onset can be assigned than would be possible if one were guided by the first appearance of clinical signs of sex differentiation. Adolescence ends when functional reproductive capacity is fully established and the child has thus become an adult. Again, the time of arrival at this state is not easily recognized, and it probably differs widely between persons, but the evidence that will be reviewed suggests that it is near to the ages at which boys and girls are usually considered to have reached manhood or womanhood.

For purposes of presentation in this review, three

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stages of adolescence will be recognized. These will be referred to as prepubescence, pubescence and postpubescence. The term "pubescence" (or the pubescent period) taken in its literal sense refers to the period of time during which the pubic hair is developing. The various criteria by which these three stages may be recognized clinically will, however, receive attention in various sections of this review.

The adolescent period is one during which profound changes take place in physical, physiologic, mental and emotional development. Since the literature dealing with these changes is voluminous and leads into many diverse fields, it will be necessary to restrict the scope of this report in a number of ways. Attention will be limited to physical growth and the principal physiologic changes of interest in clinical medicine. Much attention will be given to the individual or group variations that are encountered in apparently normal persons, but pathologic processes as they affect growth and gross abnormalities of growth will not be considered. Furthermore, it will not be possible to deal fully with the studies of fundamental genetics, endocrinology and ecology to see what light they shed on the causes for the changes observed with growth and development during adolescence. The endocrine glands will be briefly considered from the viewpoint of their development and functioning during this period. Although the study of the hormonal control of the growth processes is a fascinating one, it would require a separate report. A few articles that throw light on the effects of different environmental forces in modifying the progress of adolescent changes will be considered, since they appear to have significance in relation to health and medical care during this period.

Longitudinal Studies of the Growth and Development of Normal Children

Davenport and Boas may be considered to have been pioneers in the movement to arrive at a better understanding of adolescence by repeated observations of adolescents over long periods of time. Davenport[1] established the forms of the average curves for growth in height and weight by this method and demonstrated that a so-called "adolescent spurt of growth" is a characteristic phenomenon. He also clarified the differences between the two sexes in the time and magnitude of this occurrence and emphasized the wide individual variability in these respects.

It is of interest to re-read the paper published by Boas[2] in 1932 in the light of many of the studies published since that time. He based his conclusions on careful repeated measurements, determination of the age of first menstruation in girls and other data obtained for children attending the Horace Mann School in New York City, some of whom were followed during the succeeding college years. In the article referred to, he reported many findings that have since been substantiated by workers dealing with larger numbers of children, particularly in regard to size and rate of growth in relation to the period of maximum growth and the age at which the menarche occurs. He introduced the question whether his findings did not imply a different tempo of physiologic changes in different persons, a suggestion that has since been clearly demonstrated. Credit will not be repeatedly given to Boas when considering the many aspects of growth and development for which he deserves recognition, because later work offers more adequate reference material, but the article cited should be looked on as a classic in this field.

At the time of the deliberations of the committees of the White House Conference on Child Health and Protection (1929-1931), interest was aroused in adolescence as a neglected and little understood period. The reports of this conference,[3] as well as of one called during this period by the Brush Foundation and Western Reserve University,[4] revealed many gaps in the knowledge regarding this period. Shortly thereafter, with the financial backing of the General Education Board of the Rockefeller Foundation and the support of other foundations as well as of local institutions, a number of research centers were organized with the primary purpose of following children through their entire adolescence. The purpose was usually to study these children from many viewpoints, but with emphasis on comprehensive personal records rather than on mass statistics. These programs are for the most part still under way, and a large number of reports from these centers have already appeared. Collectively, they give a much clearer concept of the normal course of events and the interrelations between them than would otherwise be possible. The studies here reviewed come from many centers, but the following are the principal examples of this movement for organized research into human maturation: the Brush Foundation, Western Reserve University School of Medicine, Cleveland; the Denver Child Research Council, University of Colorado; the Institute of Child Welfare, University of California; the Adolescent Study Unit, School of Medicine and Institute of Human Relations, Yale University; the Harvard Growth Study, Harvard School of Education, the Center for Research in Child Health and Development, Harvard School of Public Health, and the Co-operative Study of School Children, Harvard University.

The reports of these studies have appeared in various journals, but some of these are not regularly seen by physicians, so that the review of the findings of clinical interest in a medical journal may increase their usefulness. The major reports have appeared in monographs published by the Society for Research in Child Development, National Research Council, Washington, D. C., and in *Child*

Development, the journal of this society. These publications will be useful to physicians interested in adolescents.

Out of all these extensive studies, reinforced by many special or restricted ones, the substance of only a few can be considered here. Several previous reviews may be consulted by those who wish a more complete bibliography, especially those by Greulich and his associates[5] and by Shuttleworth,[6] both published in 1938, and that by Jones and a committee of the National Society for the Study of Education,[7] published in 1944.

Physical Growth

In studying the growth of children, curves based on averages for each age have some value in showing general trends, but they must be interpreted guardedly, for they tend to mask characteristic differences among various types of persons. This is particularly important in considering growth during the adolescent years, when such wide differences in progress are encountered between those who mature early and those who mature late. A few general features of growth will be deduced from the composite curves before individual and group differences are discussed.

The following brief statement regarding the rate of growth in height and weight by year of age and by sex is based primarily on a recent report by Simmons.[8] This report gives average figures from repeated measurements taken at the Brush Foundation throughout the adolescent years in a large number of children. The averages obtained from this source may be somewhat advanced for the United States as a whole, since the children enrolled did not represent a true sample of the population but a group representing rather better than average socioeconomic levels. These averages are, however, in close agreement with those obtained for girls by Dearborn and Rothney,[9] from the Harvard Growth Study, by the Ministry of Health of Canada on Toronto school children[10] and from other extensive sources in the United States, some of which are referred to later in this report. The curves produced by the yearly increments in height and weight obtained by Simmons are quite different from some obtained by workers in other countries or in earlier years — for example, those based on German data reported by Pfuhl in 1928, as presented by Greulich.[11] The possible explanations for these differences are briefly discussed below.

Considering only average occurrences, the rate of growth in height — that is, the increment year by year — is continually diminishing from birth to maturity except for a short period that is referred to as the adolescent spurt of growth. The rate of this decrease is rapid during the first two years but diminishes year by year during the preschool period. During the early school years it becomes so slow that the curve of increments appears almost flat. According to Simmons, girls gain in height at an accelerating rate from nine to twelve years, whereas boys do so from eleven to fourteen years. This results in the fact that girls are taller than boys between eleven and thirteen years. From thirteen years in girls and fifteen years in boys the rate of growth in height decelerates rapidly, and after about three years it ceases. According to these yearly averages, the twelfth year in girls and the fourteenth year in boys appear to be those of maximum growth. As will be seen in connection with more detailed studies of different groups of children, maximum growth actually takes place most frequently at some time during the thirteenth year in girls and the fifteenth in boys, but the inflection in the curve takes place during these years also. It is for this reason that the total gains average less during these than the preceding one for each sex. During the three years of upward trend different groups of children are taking shorter, sharper single spurts of growth at different ages, for reasons which will be discussed, so that the composite curve becomes flattened and broadened. Thus, the child actually grows at a much more rapid pace than the composite curve suggests, but for a shorter period of time.

The average increments for weight by years show a somewhat different picture. Following the initial infantile spurt of growth, deceleration takes place more rapidly for weight than for height, and the increment each year remains about the same between two and five years, a period during which it is smaller than at any other time before maturity. From five years onward there is a slight but progressive increase in gain each year.* This acceleration of gain in weight becomes much more rapid at the time when accelerating growth in height begins, and it terminates at approximately the same time as does that in height, although it tends to be spread over a somewhat longer period. The curves produced by the increments for height and weight for both sexes are reproduced from Simmons's monograph in Figures 1 and 2.

The pattern of linear growth as exemplified in the curves for height is followed in the main by the principal body dimensions and even by the small bones of the hand, as shown by Shuttleworth[12] from measurements taken on roentgenograms. Yet growth is not uniform in the percentage of mature size added in the different dimensions in any given year, or even in the exact age at which maximum growth occurs. Changes in the form and proportions of the body are constantly occurring. In con-

*This gradual rise in the increments for weight from five to ten or twelve years, leading up to the major adolescent acceleration, has been considered by some investigators to be part of this whole cycle and an early sign that the changes that lead to pubescence are already operating. Linear growth is actually diminishing during this period, however, and the gain in weight may be associated with other factors. In fact, measurements of large numbers of children in other countries or under special conditions fail to reveal a rise during much of this period. Hence this early rise, as generally shown in the United States may be a manifestation of this country's particular dietary customs and socioeconomic conditions.

formity with the law of cephalocordal progression of relative growth increase, whereas during early adolescence the head has practically completed its enlargement, the lower segment is growing rapidly. Growth in the legs slows down and ceases somewhat before that in the trunk, however, so that the sitting height-stature index, which becomes smaller each year

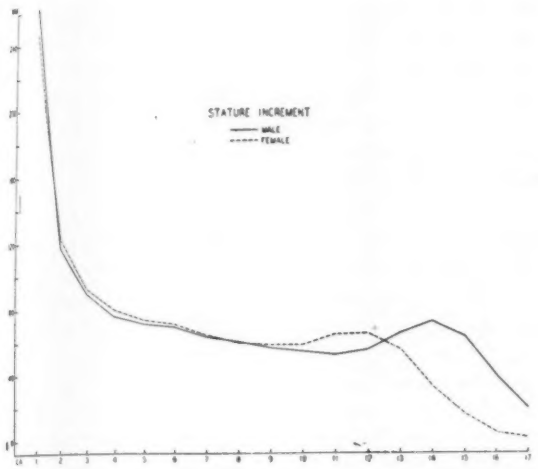

FIGURE 1. *Stature Increment according to Chronological Age (reproduced from Simmons,[8] by permission of the author).*

during early adolescence, reaches a plateau before puberty and is slightly reversed after it. With the use of hip ratios to reveal relative breadth-length growth, it has been found that from about twelve years onward girls become relatively broad-hipped, whereas boys maintain a constant ratio. On the other hand, when hip width and shoulder width are

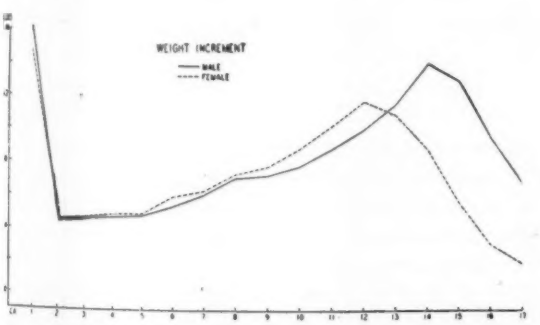

FIGURE 2. *Weight Increment according to Chronological Age (reproduced from Simmons,[8] by permission of the author).*

compared, boys are found to progress more rapidly in shoulder breadth, whereas girls progress more rapidly in pelvic breadth. Bayley[13] has shown that girls exceed boys in pelvic breadths at all ages from eleven to sixteen years, but thereafter the two sexes are nearly alike in this measurement, owing to the generally larger size of boys.* In biacromial shoulder breadth, girls exceed boys from eleven to fourteen years owing to their general advancement, but thereafter boys greatly exceed in this measurement owing both to more rapid general growth and to greater broadening out in this area. These and other differences in rates of growth during adolescence lead to the characteristic differences between men and women in average size, build and contour.

Meredith[14] for boys and Boynton[15] for girls give means for eighteen body measurements for each age up to eighteen years, as well as increments for each of these at the successive age intervals. In subsequent publications these authors[16, 17] give further anthropometric norms, and Gray and Ayres[18] give norms for some of these measurements based on studies of private-school children. Although many other tables of norms based on studies of large groups of children have been published and are useful as standards, the references cited are as complete and representative as any available for clinical purposes. In Table 1 a few of the segmental and sex differences

TABLE 1. *Segmental and Sex Differences according to Year of Maximum Growth.*

MEASUREMENT	YEAR OF MAXIMUM GROWTH	
	BOYS	GIRLS
Weight	15	12
Height	14	12
Sitting height	15	12
Shoulder breadth (bideltoid)	14	12
Pelvic breadth (bi-iliac)	—	13
Hip breadth (bitrochanteric)	14	—
Thoracic circumference	14	11

that emerge during adolescence are revealed by the ages at which maximum growth occurs in some of the principal measurements for each sex, as given by Meredith and Boynton.

INDIVIDUAL VARIATIONS IN GROWTH

Davenport,[1] in the studies previously referred to, called attention to the marked differences between children of the same age — in the age at which the adolescent acceleration in growth begins and ends and in the magnitude of this spurt of growth. Many studies dealing with these differences have appeared since Davenport's description was published. Shuttleworth[19] has shown that when the yearly increments of gain in height for different groups of girls selected on the basis of their ages at the time of maximum growth are charted with the years of maximum growth superimposed, the several curves fit remarkably well but differ in their magnitudes. These studies will be further discussed in considering the relation of this cycle of growth to the menarche. The same applies for the curves of height increments for boys and for those of weight and other dimensions for both sexes. The point of importance to be derived from all these studies is that

*The development of the pelvis in girls is described in connection with the secondary sex characters.

children pass through the adolescent phase of accelerated growth at widely different chronological ages, but that in all aspects of growth they follow much the same sequence or pattern for any particular measurement regardless of when the adolescent phase is initiated. Thus, when chronological age is ignored and age of either initial growth acceleration or maximum growth is substituted, there is far greater uniformity between children. Certain differences have, however, been recognized between children taking this growth very early and those taking it very late. Children having early occurrence of maximum growth tend to differ from those having late occurrence in the following ways: the maximum increment is greater in amount; the whole cycle is completed in a shorter time; the children are larger before maximum growth but are likely to be more alike or even shorter at the end because growth is completed more quickly; and maximal growth occurs early rather typically in broad-hipped persons and those with relatively short legs — that is, in those with a feminine configuration.

The actual variability in age of maximum growth is suggested by Shuttleworth's analysis of its occurrence among 174 girls. In 6 cases it occurred between 10¼ and 10¾ years, and the numbers for each successsive six-month age interval were respectively 13, 26, 34, 37, 28, 18, 7 and 5, the last falling between 14¼ and 14¾ years. In 99 of 174 girls, or more than half, it occurred between 11¾ and 13¾ years. For boys the distribution was approximately the same but occurred two years later. The stimulus to be advanced or retarded in growth is a general one and affects all dimensions. One may therefore use age of maximum growth, preferably in height, as an indication of the characteristics of a given child in respect to his speed or advancement of growth. In later sections this variability in the timing of growth changes will be related to variability in maturation in other respects.

For correlation with other indices of adolescent development, the significant points about physical growth may be summarized as follows. As shown by average occurrences in groups of healthy children in the United States, the change from a decelerating rate of growth in height to an accelerating one, which marks the beginning of the adolescent spurt, occurs during the tenth year in girls and during the thirteenth year in boys. The change from an accelerating to a decelerating rate occurs in the thirteenth year in girls and in the fifteenth year in boys. A change from a slow to a more rapidly accelerating gain in weight occurs at about the same time as the first inflection in height increments, and a change from an accelerating to a decelerating rate occurs at approximately the same time as does that for gain in height. Second, the change from a decelerating to an accelerating rate of growth in height — as in most linear dimensions — represents a characteristic stage in adolescent development, and this can usually be recognized when subjects are measured at regular intervals. It is more readily recognized and is more certainly attributable to a stage of development than is the initial stage of adolescent acceleration in gain in weight. The latter is likelier to be a gradual change from slight acceleration to greater increments and is more irregular. Third, the period during which maximum growth takes place is much more easily recognized than is the beginning of acceleration, because the increase in the rate of gain is usually much greater. One cannot be sure that the maximum has been attained until measures of the first phase of deceleration are at hand, but a study of the amounts of gain period by period makes it possible to conclude that the maximum has probably been reached or that the point of inflection in the curve is about to take place. Other physical characteristics, usually associated with maximum growth, described below, help to identify this period. Lastly, the time interval between onset and termination of adolescent acceleration in growth in height averages three years but is usually much shorter for the individual. When children are divided into groups on the basis of the age at which they attain maximum growth, the duration of the period of acceleration for the separate groups averages about two years. Those maturing early may complete this phase in about a year, and late or slower maturing persons usually take considerably longer. The duration of the accelerating period is somewhat longer for measurements of breadth. On the average, the duration of the period of rapid gain in weight is greater than that of growth in height, owing to the influence of acceleration in other measurements that precede or follow that of height.

Growth of Principal Tissues

The adolescent spurt of growth has a far greater proportional magnitude for weight than for height. This is due in part to a tendency to accumulate larger quantities of fat in the subcutaneous tissue during adolescence, a trend that is more pronounced in girls than in boys. McCloy[20] used subcutaneous tissue calipers for measuring folds of skin and subcutaneous tissue in conjunction with certain circumferences as aids in interpreting body weight. He gives values for these tissues in various parts of the body by age and by sex; the sex differences in this attribute are strikingly shown in his tables. Stuart and Sobel[21] in studies of tissue breadths in the calf, as visualized in x-ray films, have shown this same sex difference at all ages up to thirteen years, the latest age for which measurements were available. At thirteen years the thickness of these tissues is increasing at an accelerating rate, indicative of the tendency to accumulate fat during

pubescence. This study shows particularly how enormously persons of the same age differ in this attribute, but demonstrates that any one child tends to have much or little subcutaneous tissue quite consistently at all ages. Fat children, however, tend to be increasingly fat during infancy and in the period of pubescence and less strikingly so during the intervening years. The obesity of adolescence can be looked on in most cases as an exaggeration of a normal tendency, possibly complicated by the particular emotional factors, food habits or lack of activity usual at this time.

The large increase in weight associated with the rapid growth of pubescence is also accounted for in large measure by broadening of the skeleton and increased massiveness of individual bones, which is shown by the incremental curves for most transverse and circumferential measurements of parts where bones are prominent. This increased stockiness of bones becomes much more marked in boys than girls during the late adolescent years, as exemplified by the differences in the growth of the jaws and facial bones in the two sexes. The muscles are also growing rapidly at this time, and this is again more marked in boys than in girls. This accounts for a considerable part of the gain in weight, although members of both sexes differ greatly in this respect. Muscle development is such an important part of normal adolescent progress that it deserves attention from the clinician conducting health examinations during these years. Muscle size, which is being considered here, is only one factor in muscle strength and functional fitness, but it should be assessed in its own right and in relation to the interpretation of body weight.

The measurements of breadths and circumferences for which tables are given by Meredith and Boynton and by McCloy in publications already cited serve particularly to recognize differences in the stockiness of bones and the size of muscles.

The rate of urinary excretion of creatinine may be taken as a measure of muscle weight; hence the curve of increase with age in this excretion can be used as a measure of muscle growth. Talbot[22] has estimated that 1 gm. of urinary creatinine excreted in twenty-four hours represents 17.8 kg. of muscle weight. In a study of children in a private school, total twenty-four-hour urinary excretions of creatinine were measured in girls and boys at each age from six through fifteen years.[23] The numbers of children studied were small at all ages, but especially so at six and fifteen years. The variability for each sex at each age was great, but the trend of the means was progressively upward and at an accelerating rate at the older ages. At all ages from six to twelve, inclusive, the boys excreted 10 to 20 per cent more creatinine than did the girls, and at fifteen years the few boys studied showed great individual differences and a few had extremely high values. The increases by year in both sexes were highly irregular owing to the small samples, but for both sexes combined they were relatively small up to nine years of age, then larger to thirteen years and much larger between thirteen and fifteen years. Although this trend must be confirmed by the study of more children, it is what might be expected from body measurements. At the age of fifteen and thereafter the differences between boys and girls would certainly be expected to increase appreciably. The implication is that maximum growth in muscle mass is a late occurrence, following that of maximum growth in height but contributing to maximum growth in weight.

Dimock[24] has studied the development in boys of physical strength and endurance and in motor abilities, using the Rogers test for physical strength or capacity and the Brace test for motor ability or co-ordination. He finds that strength virtually doubles between twelve and sixteen years, but that the peak of increase takes place after the maximum rate of growth in height and weight and during the years of postpubescence. The tests of motor ability or co-ordination showed continuous moderate improvement, but this improvement was more rapid in the prepubescent and postpubescent periods than during the period just preceding that of maximum growth. Dimock's findings did not confirm the widely accepted view that a substantial loss of motor control and resulting awkwardness are associated with the period of rapid growth.

In 1940, Espenschade[25] reported the results of motor-performance tests applied periodically to a group of adolescent children being followed at the Institute of Child Welfare, University of California. Because of the extensive observations being made on these children, it was possible to study the relation between motor performance and both physical growth and the evidences of maturity. Six tests of motor performance were used that had been found to be sufficiently reliable, valid and consistent for the purpose of giving evidence concerning co-ordination, strength, speed and accuracy. The mean performance of boys in all tests increased steadily and markedly at each age up to seventeen years, whereas girls failed to improve after fourteen years and in some cases showed a decline thereafter. There were marked individual differences in all tests and in both sexes, but boys on the average surpassed girls in all tests, and this difference increased with age.

This field of study has recently been greatly stimulated by a national realization that an unnecessarily large proportion of American youths are handicapped by faulty development or physical defects at the time when they must begin to assume the responsibilities of adult life. Anyone who has devoted much time to the study of adolescents is familiar with the inactive and generally poorly adjusted youth who eats unwisely and excessively,

takes little exercise and in consequence becomes fat and flabby and performs poorly in tests of physical fitness. It is a pertinent question whether lack of regular physical activity and effort during the years in which muscles naturally enlarge and strengthen rapidly may not lead to permanent underdevelopment in this respect. Adequate but controlled use appears to stimulate muscle development and is probably most effective when muscles are developing most actively. Possibly the likes and habits of girls during these years, since girls are less athletic than boys, lead in part to late sex differences in muscularity. It does appear that psychologic problems in adolescence may have much to do with the rounding out of physical development in this respect and that they deserve attention. Shuttleworth has pointed out that, since the individual adolescent usually passes through the period of rapid growth in about two years, with one period of extremely intensive growth, and not in the less intense and more prolonged manner suggested by the average curves, force is added to the argument for greater attention to food and other needs during this period.

(To be continued)

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CASE RECORDS OF THE
MASSACHUSETTS GENERAL HOSPITAL

Weekly Clinicopathological Exercises

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

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CASE 32201

PRESENTATION OF CASE

A sixty-two-year-old Italian-born paint and lacquer sprayer entered the hospital because of abdominal pain.

Two months before admission an ache developed in the right upper quadrant of the abdomen, which was constant and not affected by food, exertion, position or respiration. It became progressively worse, and after a month he was incapacitated by it. Three weeks before admission there was radiation to the right shoulder and right flank. During the illness he maintained a good appetite but lost 10 pounds. There were no gastrointestinal symptoms or changes in bowel habits.

For many years he had had a productive cough, worse in the morning. The sputum was usually dirty brown. There had been no blood streaking.

Physical examination revealed a firm mass occupying the epigastrium. The right border of the mass was nodular, but the left border was round. The liver was not felt separately from the mass, nor was the spleen palpable. The prostate was one and a half times its normal size, slightly tender, soft and symmetrical. There was slight clubbing of the fingers. Except for a soft apical systolic murmur the rest of the findings were normal.

The temperature was 100°F., the pulse 102, and the respirations 24. The blood pressure was 142 systolic, 90 diastolic.

The red-cell count was 3,760,000, with 13.5 gm. of hemoglobin. The white-cell count was 10,200, with 78 per cent neutrophils. The urine was normal except for bile in one of three specimens. The stool gave a ++++ guaiac reaction. The prothrombin time was 25 seconds (normal, 19 to 22 seconds). In the x-ray film, the right dome of the diaphragm appeared elevated and showed a localized shallow lump in its anterior portion. Each lower lobe of the lungs had a small area of atelectasis. At the right of the lower portion of the trachea and in the right tracheobronchial angle there were two oval masses. A small irregular area of increased density was seen in the third right interspace, and a smaller rounded one in the left fourth interspace. There was still another nodule beneath the left dome of the diaphragm. In the gastrointestinal series curling of the lower end of the esophagus was described. In addition there were defects said to be consistent with varices, as well as a small hiatus hernia. The second portion of the duodenum seemed to be pressed on by a mass, but this finding was questionable. The colon was normal.

Eight days after admission the patient vomited about 400 cc. of dark, reddish-black liquid, which gave a ++++ guaiac test. The stools passed after that day were tarry. Within the next two days the hemoglobin dropped to 9 gm., despite transfusions. There was no other hematemesis. He died on the eleventh day, after a fifteen-minute period during which he was unresponsive.

DIFFERENTIAL DIAGNOSIS

DR. JAMES H. TOWNSEND: Dr. Lingley, will you demonstrate these interesting x-ray findings?

DR. JAMES R. LINGLEY: The film of the chest shows two sharply defined masses in the right paratracheal region projecting into the right upper lung field. There is also an area of density in the right third interspace, and a nodule in the left fourth interspace. The diaphragm is distinctly elevated on the right, and in the lateral view the elevation is found to be anterior. The elevation is more sharply limited and more convex than what one usually sees when it is due to a weak leaf of the diaphragm. It suggests a mass in the liver. This film of the lower esophagus shows curling — a series of rounded bulges of the barium-filled lumen. Fluoroscopically these were inconstant; they came and went and were of no clinical significance. Another film of the lower esophagus shows an irregularity of the mucosa that is indicative of varices. I cannot be sure that they are present. The appearance is suggestive but not characteristic.

DR. TOWNSEND: Do the films give any idea of the size of the liver or of the shape of the lower border?

DR. LINGLEY: The liver presses the hepatic flexure downward and extends to the notch of the crest of the ilium.

DR. TOWNSEND: Do they give any indication of an enlarged spleen?

DR. LINGLEY: The spleen is probably normal in size, but it is not distinct.

DR. TOWNSEND: There is also a nodule beneath the left dome of the diaphragm. Is that not an unusual place?

DR. LINGLEY: I cannot see that nodule.

Here are the films of the stomach, and I should like to point out one thing not mentioned in the record. There is a defect on the lesser curvature at this point, and it is important to decide whether it is due to pressure from the left lobe of the liver or to an intrinsic lesion of the gastric wall. From this one film and without fluoroscopy I am inclined to

think that it was an intrinsic lesion of the stomach. I do not want to lead you astray, however, and all things being considered, we should probably believe the fluoroscopist, who found nothing wrong with the stomach.

DR. TOWNSEND: To summarize the significant features of this case, this was a sixty-two-year-old Italian who had an interesting occupation in that he used lacquer and presumably various kinds of chemicals and may possibly have encountered something in that occupation that damaged the liver. He had had symptoms for only two months, and the presenting symptom was pain in the right upper quadrant radiating to the shoulder, which suggests something in the diaphragm. In confirmation of this is a lesion shown by x-ray, which apparently involves the capsule of the liver and the diaphragm. He had had a chronic cough with brownish sputum but never any blood. Shortly before death there was a massive hemorrhage from the gastrointestinal tract. The outstanding physical finding is the large nodular liver. We have laboratory evidence that is mainly negative, except that he had a mild degree of normochromic anemia at the time of entry and was showing blood in the stools even at that time. He also had a prolonged prothrombin time, on which I shall comment later.

The x-ray studies give definite evidence of nodules scattered in the chest, below the diaphragm and in the liver. I think that we must assume that there were at least two nodules of considerable size in the liver, one of which projected into the dome of the diaphragm and the other into the epigastrium. It is difficult to offer any explanation of this patient's picture except one on the basis of widespread malignant neoplastic disease, which involved the chest as well as the liver.

What was the origin of this malignant disease? Was it primary or secondary in the liver? What was the probable point at which it arose? I should like to approach the problem from two angles — first, the probable causes of nodules in the liver, and second, the usual causes of massive hemorrhage in the gastrointestinal tract. I shall try to find a reasonable common denominator. I should like to say now that, if this was metastatic cancer in the liver, it would be unusual for lesions of recent origin to produce certain changes that were present in this case. I am going to assume that there were esophageal varices. It would be unusual for metastatic cancer alone to cause enough disturbance in the portal circulation to produce esophageal varices. By the same token it would be rather unusual for a few nodules in the liver to cause enough disturbance of the liver function to produce an increase in the prothrombin time. It would be interesting to know whether this patient showed other evidence of cirrhosis, because metastatic cancer does not usually produce severe damage of the liver parenchyma itself unless it is extremely extensive. Among the causes of nodules of this sort, however, the most frequent is metastatic malignancy. One must also consider the possibility of a primary malignancy in the liver, which may have arisen from a pre-existing hepatic disease, such as portal cirrhosis. One must also consider other types of liver disease, such as a long-existing hepatitis, originally acute yellow atrophy, with subsequent regeneration, which sometimes takes the form of nodules that can definitely be felt. This possibility is suggested only by the fact that in his occupation he had dealt with various chemicals. One should also consider echinococcus cyst, but I see nothing in this case to suggest that diagnosis. Syphilis can also produce a nodular liver. I do not know what the serologic tests showed in this case, but syphilis would not explain the nodules in the chest, and I shall rule out that diagnosis.

If we look at the problem from the point of view of the more probable causes of massive fatal hemorrhage in the gastrointestinal tract, we should consider such causes as ulcerating malignant neoplasms of the stomach, the duodenum and the pancreas, as well as peptic ulcer, which can produce fatal hemorrhage and can also coexist with cirrhosis of the liver. We should also consider esophageal varices, which are perhaps the most frequent cause of such massive hemorrhage as this patient appears to have had. Also such a thing as a ruptured aneurysm should be considered, but I do not believe that we have enough evidence in this case to suggest that as a possibility. One should also consider a general bleeding tendency, such as that which occurs in the terminal stages of many chronic constitutional diseases. We have no evidence of that, except the increased prothrombin time. There is no evidence of increased bleeding or clotting time.

From the data at hand it is impossible for me to say, at least with any assurance, what was the primary source of this malignant tumor and whether the lesions in the liver were primary or secondary. If they were secondary, such nodules as these usually come from below the diaphragm — from the stomach, duodenum, pancreas or colon or possibly from the prostate. In this case the patient had an enlarged prostate, but it is not described as nodular or stony hard and nothing is said about it to suggest that it was cancerous. Such nodules can also come from primary lesions in the chest. Indeed, in the last case that I discussed here before the war there was a large nodular liver, quite similar to this, with two nodules in the lungs; it proved to be a primary carcinoma of the lung, which had been asymptomatic.

Arguing from the fact that this patient appeared to have more liver disease than one would expect from a few nodules, from the presence of esophageal varices, which I believe ruptured and resulted in death and from the presence of a prolonged prothrombin time, I am going to venture an opinion

that this man had liver disease of longer duration than the few months that this malignant disease had existed. My first choice for diagnosis, therefore, is a primary tumor of the liver arising on a pre-existing cirrhosis. I do not believe that that can be backed up clinically, that is, by positive proof during life. As a second choice, I choose metastatic cancer of the liver and lungs, most probably primary in the abdominal cavity, such as in the upper silent portion of the stomach, where it is difficult to demonstrate ulcerating lesions, but possibly from the lung. As I have said before, it is impossible to be certain about the point of origin of these malignant tumors.

A Physician: There is no mention whether the mass did or did not move with respiration. If we could assume that it did move with the liver it would make a great deal of difference.

Dr. Donald S. King: Dr. Townsend remembers a case in which the tumor was primary above the diaphragm, with metastases below. The one that I had a few years ago was the other way around — primary in the stomach, with metastases to the nodes about the lung roots.

How often does a tumor of the stomach metastasize to the liver?

Dr. Tracy B. Mallory: It is quite characteristic. Betting on the wards favored primary cancer in the stomach, with secondary nodules in the liver.

Dr. Charles L. Short: If we assume that there was cirrhosis, does that make metastatic cancer less likely? According to statements made in various reports, metastases to a cirrhotic liver are relatively rare.

Dr. William Clark: In an autopsy done several months ago there was primary cancer of the lung with metastases to a cirrhotic liver.

Clinical Diagnosis

Carcinoma of stomach, with metastases to liver and lungs.

Dr. Townsend's Diagnosis

Malignant tumor, primary in liver, arising from pre-existing cirrhosis, with generalized metastases.

Anatomical Diagnoses

Hepatoma, with metastases to lungs, pancreas, kidneys and mediastinal and retroperitoneal lymph nodes.
Cirrhosis of liver.
Esophageal varices.
Hydrothorax, bilateral.

Pathological Discussion

Dr. Mallory: The autopsy on this patient showed a greatly enlarged liver with large and small tumor nodules jutting out all over the surface. Between the various tumor nodules, however, a few small areas of liver tissue could still be recognized, and these areas were definitely cirrhotic. Besides the tumor in the liver, the pancreas was found completely replaced by tumor and there were metastases in the lungs. The presence of invasive neoplasm in the pancreas raised doubt at the time of autopsy concerning the nature of the tumor, but there was one point that I think is strong evidence in favor of a hepatoma: when one examined the liver from the posterior surface and looked at the hepatic vein, a tumor thrombus was seen to project from the mouth of the vein into the vena cava, and on examination of the rest of the liver all the hepatic veins were found to be filled with tumor thrombi. There are only two tumors that more or less regularly grow into veins in the form of gross thrombi. Hypernephroma is one of them, as you know; this frequently fills the renal vein and later the vena cava. Hepatoma is the other; indeed, it is not infrequent for a hepatoma to show growth up the hepatic vein into the vena cava and sometimes directly into the right auricle of the heart, which may become completely filled with tumor. On this basis I thought at the time of autopsy that the liver was the probable primary source of the tumor. Microscopically the sections do not help us a great deal further. They are consistent with a hepatoma but not particularly characteristic of it. The tumor was certainly undifferentiated, so that a positive histologic diagnosis is scarcely possible. To my eye it does look considerably more like a liver-cell tumor than a pancreatic tumor, and I think that the gross anatomic appearance and the massive venous invasion are enough to substantiate the diagnosis of hepatoma based on a pre-existing cirrhosis.

The terminal episode was almost certainly, as suggested, a rupture of an esophageal varix, since the stomach was filled with clotted blood. We were unsuccessful in demonstrating the point of rupture.

Dr. Townsend: I should like to ask whether these varices can rapidly develop secondary to malignant disease or whether they take time, years, to develop?

Dr. Mallory: On occasion we have seen esophageal varices for which we could determine no cause.

Dr. Townsend: But is it not true that you usually do not see them associated with a liver full of metastatic cancer?

Dr. Mallory: Almost never.

CASE 32202

Presentation of Case

First admission. A thirty-year-old housewife entered the hospital because of leukorrhea and metrorrhagia of three months' duration.

The patient had had one child, a normal infant born eighteen months before admission after a long, difficult labor. On physical examination there was tenderness in both lower quadrants just above the

groin. The large, hard cervix was fixed on the left. The posterior lip was eroded, and there was a cauliflower-shaped mass in the external os. Biopsy revealed a Grade III epidermoid carcinoma of the cervix. A chest film, an abdominal film and an intravenous pyelogram were normal. A program of x-ray and radium treatment was outlined in preparation for surgical excision of the tumor, and the patient was discharged on the third hospital day.

Second admission (six weeks later). In the interval the patient had received a total of 3000 r by the million-volt machine directed to the anterior and posterior cervix. The vaginal discharge had ceased.

On readmission the physical findings were unchanged, except for induration and fixation of the upper posterior vaginal wall, which had not been observed previously. One hundred milligrams of radium were sutured in the cervical canal on the second and seventh hospital days, and five 10-mg. needles were placed around the periphery and left for a total dose of 2250 millicurie hours after each operation. She was discharged on the eighth day.

Final admission (eighteen months later). Following her last entry the patient gained weight and vigor and felt well for the first six months. She then began to have short episodes of diarrhea, characterized by the passage of five or six liquid mucous and blood-streaked stools daily, which were fairly well controlled by paregoric. Two months before admission she became weak and anorexic and had to go to bed. Two weeks later she became nauseated and vomited about every other meal. By the end of three weeks she had become extremely anorexic and weak. The urine was dark, and the stools were light. The abdomen felt so bloated that it interfered with respiration on lying down. One month prior to admission the patient entered another hospital, where the hemoglobin was found to be 22 per cent and she was treated with eight transfusions. After the fourth transfusion, she felt chilly and it was noted that her skin was yellow. The remaining transfusions proceeded uneventfully. The patient stayed in the hospital ten days and then returned home. For about ten or twelve days after its onset the jaundice became deeper and the urine became darker; iron therapy obscured the color of the stool. After that the jaundice decreased and the urine was lighter but did not become normal. Hemorrhoids had developed within the three-month period before admission. The night before admission the patient drank a glassful of water and five minutes later vomited it. Five minutes after that she vomited again, the vomitus being light red.

On physical examination the patient was emaciated and mildly icteric. The heart seemed normal except for a Grade II apical systolic murmur. There were flatness, absent tactile fremitus and whispered voice sounds and diminished spoken voice sounds at the right base. The abdomen was protuberant and firm and seemed to be full of fluid. The skin of the abdomen was mottled. The vagina was contracted and firm. The cervix and vaults were obliterated. Moderate sacral and ankle edema was present. There were external hemorrhoids.

The temperature was 98.6°F., the pulse 104, and the respirations 20. The blood pressure was 112 systolic, 70 diastolic.

The red-cell count was 2,200,000, with 5.5 gm. of hemoglobin. The white cell count was 4800, with 90 per cent neutrophils. The urine specific gravity was 1.010, and there was a +++ test for bile. Urobilinogen was demonstrated in a dilution of 1:32. The urinary sediment was normal. The stools repeatedly gave +++ guaiac tests. Other laboratory findings were as follows: total protein, 5.4 gm., with 3.2 gm. of albumin and 2.2 gm. of globulin; nonprotein nitrogen, 15 mg.; van den Bergh reaction, 7.7 mg. direct and 10.3 mg. indirect; cephalin-flocculation test, negative at twenty-four hours and + at forty-eight hours; prothrombin time, 43 seconds (normal, 19 to 22 seconds); phosphorus, 2.5 mg.; alkaline phosphatase, 29.7 units; and cholesterol esters, 79 mg. On x-ray examination the liver appeared enlarged and the flanks were bulging. There was a small ring shadow in the right upper quadrant. Both costophrenic angles were obliterated, evidently by small amounts of fluid. The right leaf of the diaphragm was irregular and elevated, and there was a translucent area between it and the liver. In the lateral projection there was a translucent area between the diaphragm and the liver, as well as a wedge-shaped area of density along the midanterior chest wall; whether the latter was on the right or left could not be determined. A barium enema revealed two areas of constriction of the ileum, each 2 cm. in length. One was approximately 16 cm. proximal to the ileocecal valve, and the other 8 cm. proximal to the first. The colon was normal.

On the second hospital day the temperature rose to 101°F. and thereafter spiked from 100 to 102° daily. The next day the red-cell count was 1,340,000. Within a week pain developed in the right shoulder and the feet became extremely tender and swollen. The esophagus, stomach and duodenum appeared normal in a gastrointestinal series performed at that time. A peritoneoscope was introduced, and 2500 cc. of yellow ascitic fluid was withdrawn. The liver appeared to be large and smooth and contained innumerable blue spots, which were thought to be consistent with passive congestion; the spleen was also enlarged. No metastases were seen in the abdomen or pelvis. The fluid had a specific gravity of 1.007 and was negative for tumor cells. On the fifteenth day pain developed in the right shoulder and axilla, and several hours later 750 cc. of red blood was vomited. The pain disappeared. Three days later 10 cc. of blood was vomited. There were no other episodes of hematemesis, but many clots

were passed by rectum. Numerous transfusions of whole blood brought the hemoglobin up to 10 gm., but the prothrombin time was not much shortened. The van den Bergh reaction gradually rose to 14.5 mg. direct and 18.3 mg. indirect, and there was accentuation of the edema of the lower extremities; the superficial abdominal veins became prominent. In the fifth hospital week there was a decided change for the worse. The jaundice deepened, and the abdomen distended with fluid. Edema of the lower extremities and dependent parts became severe. The total protein was 5.4 gm. per 100 cc. Pain was constant in the region of the right anterior axillary fold. The superficial veins became more prominent. The liver, which had been felt after the paracentesis for the first time, extended three fingerbreadths below the costal margin and was tender. The spleen was palpable. The breath smelled mousey.

Two weeks later she began to be confused. Six liters of yellow-brown fluid was withdrawn from the abdomen. The van den Bergh reaction was 20 mg. direct and 25.9 indirect, and the phosphorus and alkaline phosphatase were 4.1 mg. and 73.1 units per 100 cc., respectively. At the end of two months she was stuporous most of the time. She died on the sixty-third hospital day.

Differential Diagnosis

Dr. Wyman Richardson: The total length of life from this woman's first admission was approximately twenty-one and a half months.

I am not going to discuss the treatment of carcinoma of the cervix. I simply wish to point out that she received a considerable amount of radiation, sufficient, I think, in a number of cases to produce real cure. Is that correct, Dr. Lingley?

Dr. James R. Lingley: Yes.

Dr. Richardson: "The urine was dark, and the stools were light." I might bring up the question, Was this due to jaundice? It is of some importance. I think that it probably was the onset of jaundice although one cannot be sure.

The hemoglobin was 22 per cent, which is extremely low. If it were a normochromic anemia, the red-cell count would be around one million.

"After the fourth transfusion . . . the skin was yellow." I shall again bring out the point that we had a suggestion that jaundice was present before she was given any transfusions. The timing of the transfusions is not given but I think we can assume that they were given in a relatively short space of time. I do not know whether that is a fair assumption.

A loud systolic murmur in a thirty-year-old woman is not normal, although it is difficult to rule out physiologic systolic murmurs on the basis of the loudness of the murmur.

I wish to emphasize that this woman had a low white-cell count (5000), with 90 per cent neutrophils. That is an unusual finding and is consistent with severe sepsis. If one had a record of the character of the cells one might be able to say definitely that this was severe sepsis. The reason that it is not in the protocol is that very likely no one looked to see if the cells showed signs of toxic sepsis.

"Urobilinogen was demonstrated in a dilution of 1:32." In a case I discussed recently I brought out the point that this is definite evidence that bile was at least reaching the gastrointestinal tract.

Another thing that I keep talking about is that we are told about guaiac tests on the stools but there is no record about their color. It is even difficult to get to look at one on the ward. It would be of some interest to know whether the stools were brown or clay colored. I take it that they were brown.

There was slight reduction in the albumin-globulin ratio. The quite low reading of the nonprotein nitrogen may have been due to the fact that this patient had liver disease. The phosphorus was slightly elevated, and the phosphatase was high.

Perhaps the small ring shadow in the right upper quadrant on x-ray examination suggests gallstones. Let us look at the films now. The area above the diaphragm and these intestinal shadows interest me more than anything else.

Dr. Lingley: On this abdominal film I think that the liver is enlarged. I cannot see the ring shadow that was mentioned in the record. The area of the gall bladder looks perfectly clear. This is the film of the chest showing the area of rarefaction described as being beneath the diaphragm. If it is beneath the diaphragm, it means free air in the peritoneal cavity. I am inclined to doubt this, because I cannot see it in the lateral view. I wonder if the upper line interpreted as diaphragm is not just a plaque-like focus of atelectasis in the lung with normal aerated lung beneath it. These are the films of the colon showing the two areas of constriction in the ileum. They are perfectly smooth and have the appearance of benign strictures.

Dr. Chester M. Jones: Could this picture be due to radiation?

Dr. Lingley: Very possibly.

Dr. Richardson: I think that it is.

Pain in the right shoulder could have been due to diaphragmatic irritation.

We do not know whether this patient received some form of vitamin K; presumably she did. If so, it apparently did not cause a decrease in the prothrombin time. The bleeding that occurred may be explained on the basis of prothrombin lack; it is not necessary to postulate a demonstrable ulcerative lesion. The fact that the prothrombin time was not shortened by blood transfusions would not be remarkable if blood-bank blood, not fresh blood, was used. Blood is not much good to provide prothrombin after forty-eight hours. Would you agree to that, Dr. Jones?

Dr. Jones: I feel the same way. The fresher the blood the better.

DR. RICHARDSON: Shall we try to explain the entire picture on the basis of one illness and the results of that illness, or do we have to search around for many incidental diseases? In the older age group the latter is often profitable. This was a relatively young person, and it is better to explain it all on one disease if we can. We might go afield, especially if there were gallstones, and think of neoplasm of the biliary system with involvement of the liver; but I shall not bring that in. The other thing that I have already hinted at is the question whether this patient had a transfusion hepatitis. I assume that the jaundice came on before the transfusion or at least appeared too soon afterward to be the result of transfusion, so I shall also rule that out.

We still have to consider the question whether this patient had acute hepatitis or subacute hepatitis going on to liver degeneration. It seems to me that there never was the acute severe febrile onset that so many of these patients with severe hepatitis have. The whole progress of the disease seems to have been chronic; and I shall rule out an acute hepatitis as being by itself the cause of the liver disease. I cannot rule out the possibility of secondary hepatic degeneration.

So then I come back to the fact that this was all the result of a single process, and of course the easiest thing to do is to say that this patient had metastatic disease from carcinoma of the cervix and try to link up the whole thing on that basis. It seems to me that a tumor of the cervix is much likelier, especially at the beginning, to extend locally rather than to produce such a widespread picture, which flared up more or less suddenly. If she had recurrence of the disease in the pelvis, I should have expected that she would have had local symptoms, especially those due to involvement of the ureters, hydronephrosis and that sort of thing. I am therefore inclined to doubt that it was due to carcinoma of the cervix, and that brings up the question Dr. Jones mentioned.

Did she have a severe x-ray enteritis or x-ray effect on the bowel? It would seem to me that, considering the amount of treatment that she had close to that area, one might say that this lesion was due to the effect of radiation therapy. This might account for the diarrhea and the gastrointestinal symptoms, but it would not account for everything. The process might have gone on further to produce fibrosis, with ulceration and actual perforation of the bowel. If we suppose that it occurred gradually, so as not to produce generalized peritonitis, it would account for sepsis in the abdomen, which was not discovered. It seems to me quite likely that this patient actually had sepsis in the abdomen, with infection of the portal and mesenteric venous system and multiple small abscesses in the liver.

What more? The patient had a Grade II systolic murmur, which brought to my mind a terminal bacterial endocarditis. Many patients with chronic illness, if they have a cardiac lesion, end up with a terminal bacterial endocarditis, and that might account for the wedge-shaped shadow in the lung. I think that this patient might have had an infarction in the lung and that of course might well have come from a peripheral vein, and it might also have come from the heart. I do not want to prolong this discussion. I will say, therefore, that I believe that this patient did not have metastatic disease from the original tumor. I think that she had an x-ray enteritis, as a result of which she had what might be called a septic phlebitis, with multiple liver abscesses followed by secondary liver degeneration, and that she died of liver failure.

DR. TRACY B. MALLORY: Are there any suggestions or alternative diagnoses?

DR. WALTER BAUER: Why could it not all be explained on the basis of an infectious hepatitis that began before the transfusions were given. The clinical course is not against such an interpretation. I admit that 90 per cent neutrophils in the presence of a white-cell count of 5000 is most unusual, although there have been some verified cases of infectious hepatitis with such a leukocyte count. Although Dr. Richardson's diagnosis may be correct, we must bear in mind other possibilities.

DR. JONES: I agree with Dr. Richardson that this woman was jaundiced before transfusion. She already had a profound anemia, and after eight transfusions she still had a profound anemia. I do not believe that an anemia of that degree was solely on the basis of an ulcerative lesion in the bowel. It could have been, but I doubt it. Another thing that I should like to comment on is the peritoneal fluid that was withdrawn some days before death — some days before she had more abdominal pain; it was a straight transudate, with a specific gravity of 1.007, which is against an inflammatory process in the abdominal cavity. Finally, I think that the signs of pressure or biliary obstruction are striking, even if there is no comment about the color of the stools. The phosphatase is striking. One can get a phosphatase that high in intrahepatic disease with jaundice, but it is not at all frequent, in fact it is quite unusual. I believe that this points to an obstructive lesion that was extrahepatic.

DR. RICHARDSON: I meant to mention the phosphatase. I have laid stress on it in other cases but thought that I would throw it overboard this time.

DR. J. H. MEANS: I can recall one patient who was here about a year ago who had a good many points in common with this woman except that the patient was a man who did not have a cancer to start with. The rest of the picture was similar, including the blood picture, and at autopsy he turned out to have just what Dr. Richardson has described.

DR. JONES: This degree of jaundice is rather intense for pylephlebitis, and there is no story of chills and fever.

CLINICAL DIAGNOSIS

Carcinoma of cervix, with generalized metastases.

DR. RICHARDSON'S DIAGNOSES

Radiation enteritis.
Pylephlebitis.
Multiple liver abscesses.
Terminal bacterial endocarditis?

ANATOMICAL DIAGNOSES

Metastases of carcinoma of cervix to liver, lung and mesentery, with obstruction of vena cava, portal vein, right branch of hepatic artery and hepatic duct.
Esophageal varices, with rupture.
Anasarca.
Splenomegaly.
Obstructions (two) of ileum, due to tumor nodules in mesentery.
Jaundice, severe.

PATHOLOGICAL DISCUSSION

DR. MALLORY: The autopsy showed that this was entirely due to one disease — cancer of the cervix. The surface of the liver, as described at peritoneoscopy, was perfectly smooth, but on section the liver was about 60 or 70 per cent replaced by tumor. This tumor had grown directly into the vena cava, and the tumor and secondary thrombosis had produced a complete obstruction of the cava. It had also grown down the lymphatic vessels around the portal vein, the common bile duct and the hepatic artery, so that the portal vein, the bile duct and one branch of the hepatic artery were occluded by external pressure of the tumor. There were some metastases to the lung, which were probably due to tumor emboli from this mass in the cava. The heart, despite the murmurs, was completely negative. The ileum was occluded in two spots by kinking around tumor masses in the mesentery. It showed no evidence of radiation enteritis.

On many occasions in these exercises we have pointed out that metastatic tumor to the liver does not produce portal hypertension. In this case the enlarged spleen, weighing 500 gm., and the presence of well marked esophageal varices leave little doubt that it existed. The obstruction, however, was apparently not produced within the liver but by the extension of the tumor into the tissues about the hilus, with constriction of the extrahepatic portal vein.

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NATIONAL HOSPITAL DAY

On May 12 the hospitals of this country observed National Hospital Day. Having satisfactorily met increasing demands on their facilities during the years of the war in spite of curtailments in personnel, equipment and supplies, they are now faced with the tremendous task of furnishing adequate facilities and care to an even greater number of people. As Dr. Peter D. Ward, president of the American Hospital Association has stated:

> This does not mean that more people will be ill, but simply that the public has become more hospital-minded. Also, the benefits of Blue Cross have made hospital care available to more people. As preventive medicine has come of age, the hospital no longer signifies a place for final and drastic measures; rather it is a place for health protection, where minor as well as major ailments may find alleviation.

It might be added that still another factor is involved, namely, that miracles in the handling of certain types of medical and surgical cases have permitted the successful hospital treatment of patients who were formerly told that nothing could be done for them.

Certain of the voluntary hospitals, whose total assets comprise two thirds of the value of all general hospitals in this country, have already made plans for new construction, but many other things must be accomplished to meet this challenge. These include hospital surveys, licensing systems, increased availability of prepaid hospital and medical-care insurance and the establishment of health centers. If a voluntary system of medical care is to continue, these hospitals must have the confidence and the enthusiastic support of the public and the medical profession. Indeed, financial assistance from state governments, supplemented, if necessary, by federal grants-in-aid, will probably be required for the successful accomplishment of this program, which has much to do with the health of the Nation.

SIXTY YEARS OF NURSING SERVICE

It is fitting that the celebration of the sixtieth anniversary of the establishment of the Visiting Nurse Association of Boston, which was held during Public-Health Nurse Week in April, should receive recognition by the medical profession.

Beginning in 1886, under the name Instructive District Nursing Association, with two nurses, it was employing one hundred and fifty nurses on its fiftieth anniversary, and it has always found opportunities far greater than its financial support has justified an attempt to meet. Throughout these years it has been a most valuable and valued ally of the medical profession and has demonstrated in its own field the indispensable nature of the contribution of the public-health nurse, not only in caring for the sick but in advancing civilization through the prevention of disease.

True to its central purpose, as the original name made explicit, it has been an educational institution, and although the first approach is through the bedside nursing of patients who, except in emergency, are under the supervision of a physician, its unit of major interest is the family: it renders family health service. Here an important approach is by

way of problems of individual and family nutrition, and this raises the question of making, using and keeping to a budget. Although this aspect of the work is time-consuming, fundamental lessons in household economics are taught.

The Association renders a community service to people of all classes. About 15 per cent of the patients pay the full cost, and 7 per cent pay part of the cost. The full cost in 30 per cent of the cases is paid for by certain insurance companies. In slightly less than 50 per cent of the cases no money is collected. Since the establishment of the Boston Community Fund, the Association has been a participating agency.

It started the first school in the United States for the training of visiting nurses, which was later taken over by Simmons College, and it continues to offer an opportunity for field work to students. Its work is carried on all over the City of Boston, and last year a total of 155,200 calls were made on 22,885 persons. It employs supervisors specially trained in nutrition, mental hygiene, social hygiene, occupational therapy, physical therapy and maternity care and in the administration of its twelve districts. Although the number of cases given care at confinement is relatively small, since so many patients go to hospitals, prenatal care was administered to 5000 women during the past year.

The scope of the Association's work cannot be described briefly, and it is impossible to measure the benefits of the ministrations of its devoted nurses through these sixty years. We congratulate the community on having in its midst such a strong and vigorous organization, and we extend, on behalf of the medical profession, best wishes for even greater usefulness in the future.

MASSACHUSETTS MEDICAL SOCIETY

DEATHS

GUNTER — Fred C. Gunter, M.D., of Belmont, died April 24. He was in his fifty-fifth year.

Dr. Gunter received his degree from Tufts College Medical School in 1914. He was a veteran of both world wars. He was a specialist in internal medicine, being particularly interested in cardiac diseases, and was formerly chief of staff of the Robert Breck Brigham Hospital, of Boston. Dr. Gunter was on the courtesy staff of the Brooks Hospital, Brookline, and was a fellow of the American Medical Association.

His widow, a son and his mother survive.

METZGER — Butler Metzger, M.D., of Lynn, died April 25. He was in his seventy-third year.

Dr. Metzger received his degree from Harvard Medical School in 1897. He was on the staff of the Union Hospital, Lynn. He was a fellow of the American Medical Association.

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

COMMUNICABLE DISEASES IN MASSACHUSETTS FOR MARCH, 1946

RÉSUMÉ

DISEASES	MARCH 1946	MARCH 1945	SEVEN-YEAR MEDIAN
Anterior poliomyelitis	2	4	1
Chancroid	1	4	*
Chicken pox	1391	1320	1471
Diphtheria	20	20	14
Dog bite	1024	783	733
Dysentery, bacillary	14	4	4
German measles	680	224	225
Gonorrhea	424	459	327
Granuloma inguinale	1	1	*
Lymphogranuloma venereum	2	2	*
Malaria	62	76	1
Measles	3085	624	3245
Meningitis, meningococcal	12	22	21
Meningitis, Pfeiffer-bacillus	4	3	3
Meningitis, pneumococcal	5	1	6†
Meningitis, staphylococcal	0	0	0†
Meningitis, streptococcal	0	0	0†
Meningitis, other forms	1	0	3†
Meningitis, undetermined	2	5	10†
Mumps	831	2789	1349
Pneumonia, lobar	243	257	423
Salmonella infections	8	8	3
Scarlet fever	894	1692	1457
Syphilis	482	412	462
Tuberculosis, pulmonary	282	230	262
Tuberculosis, other forms	23	20	20
Typhoid fever	3	1	2
Undulant fever	5	5	3
Whooping cough	594	853	874

*Made reportable December, 1943.
†Four-year average.

COMMENT

Diphtheria, German measles and pulmonary tuberculosis were reported at figures above their seven-year median. The slight increase in the last is undoubtedly attributable to state-wide case-finding programs. Salmonella and bacillary dysentery cases were also reported at higher figures. Dog bite reached a record high figure for the month. The high incidence of malaria is due to its appearance in veterans from malaria-infested zones.

Reported at a record low figure was lobar pneumonia. Measles was reported at a figure below the seven-year median, in spite of a marked national increase. Also at figures below the seven-year medians were chicken pox, mumps, scarlet fever, whooping cough and meningococcal meningitis.

GEOGRAPHICAL DISTRIBUTION OF CERTAIN DISEASES

Actinomycosis was reported from: Holyoke, 1; Lawrence, 1; Malden, 1; total, 3.

Anterior poliomyelitis was reported from: Everett, 1; Spencer, 1; total, 2.

Diphtheria was reported from: Boston, 10; Cambridge, 1; Dracut, 1; Falmouth, 1; Ipswich, 1; Lowell, 1; Medford, 1; Melrose, 2; Taunton, 2; total, 20.

Dysentery, bacillary, was reported from: Boston, 1; Marblehead, 1; Wrentham (State School), 12; total, 14.

Encephalitis, infectious, was reported from: Worcester, 1; total, 1.

Malaria was reported from: Boston, 11; Brockton, 2; Brookfield, 1; Brookline, 1; Cambridge, 4; Chelsea, 1; Dartmouth, 1; Gardner, 1; Holbrook, 1; Holliston, 1; Lawrence, 1; Lynn, 1; Malden, 3; Medford, 2; New Bedford, 2; Newton, 2; Peabody, 3; Pittsfield, 2; Quincy, 1; Rockport, 1; Somerville, 2; Springfield, 2; Stoneham, 1; Stoughton, 2; Tyngsboro, 1; Waltham, 1; Waltham Regional Hospital, 1; Warren, 2; Westfield, 1; Worcester, 7; total, 62.

Meningitis, meningococcal, was reported from: Boston, 4; Brockton, 1; Clarksburg, 1; Everett, 1; Fall River, 1; Lawrence, 1; Lowell, 1; Medford, 1; Somerville, 1; total, 12.

Meningitis, Pfeiffer-bacillus, was reported from: Everett, 1; Petersham, 1; Springfield, 1; Wareham, 1; total, 4.

Meningitis, pneumococcal, was reported from: Fall River, 1; Lynn, 1; Marblehead, 1; Winthrop, 1; Worcester, 1; total, 5.

Meningitis, other forms, was reported from: Phillipston, 1; total, 1.

Meningitis, undetermined, was reported from: Camp Edwards, 1; Nantucket, 1; total, 2.

Salmonella infections were reported from: Boston, 2; Granby, 1; Lynn, 1; Newton, 1; Revere, 1; Southampton, 2; total, 8.

Septic sore throat was reported from: Attleboro, 1; Boston, 7; Medford, 1; Merrimac, 2; Newton, 1; Orange, 1; Williamstown, 1; total, 14.

Trachoma was reported from: Milton, 1; total, 1.

Trichinosis was reported from: Adams, 3; Boston, 1; total, 4.

Typhoid fever was reported from: Fall River, 1; Lawrence, 1; Norwood, 1; total, 3.

Undulant fever was reported from: Adams, 1; East Longmeadow, 1; Melrose, 1; Nantucket, 1; Southbridge, 1; total, 5.

MISCELLANY

NOTES

The Boston Surgical Society awarded the Henry Jacob Bigelow Medal to Dr. Frank H. Lahey on May 10. Dr. Lahey gave an address entitled "Surgery of the Thyroid," following which he was presented with the Bigelow Medal by the president of the society, Dr. Donald Munro.

The Board of Managers of the Quincy City Hospital have recently announced that Dr. Ensio K. F. Ronka was appointed director of the hospital on April 1.

CORRESPONDENCE

MORE ABOUT BACTERIOLOGIC LABORATORIES

To the Editor: I was much interested in the letter from Dr. Wails, Commissioner of Health of Worcester, Massachusetts, regarding health department bacteriological laboratories, which appeared in the March 14 issue of the *Journal*.

It might be interesting to your readers to know that the City of Boston started the examination of throat cultures for diphtheria in November, 1894. During that and the following month, 1002 cultures were examined, with 246 positives. This work was performed at the Harvard Medical School by Dr. McCollum, physician to the Board of Health. The 1894 report reads, "All physicians were invited to take cultures from throats where diphtheria was suspected, and for their convenience, culture tubes in cases were provided and stations were established at drugstores, where physicians could obtain tubes for cultures." Ten stations were established, one of which is still in existence.

November, 1894, also saw the beginning of the manufacture of diphtheria antitoxin by the Boston Health Department. This work was performed on Gallup's Island, in Boston Harbor, by Dr. Harold Ernst, of Harvard Medical School, assisted by Dr. C. G. Page and Dr. S. A. Hopkins. It was not until 1898 that the Commonwealth took over this work.

When I first read Dr. Wails's letter, without annual reports at hand, it immediately came to mind that perhaps Boston had a little something on Worcester, but as can be gathered from this letter, the Oscar will have to be given to Worcester by two months.

FREDERICK J. BAILEY, M.D.
Health Commissioner
Health Department
Haymarket Square
Boston 14

FIRST USE OF X-RAYS IN BOSTON

To the Editor: March marked the conclusion of fifty years since Walter Dodd made his first experiments in the use of a Crookes's tube at the Massachusetts General Hospital. I believe that the occasion warrants at least a brief mention of Walter Dodd and of the late "Joe" Godsoe, — his assistant at that time, — who died on February 8.

I well remember an incident that may have been prophetic. On the morning after Walter Dodd made his first experiments with the Crookes's tube he gave a brief demonstration with the fluoroscope before several physicians and surgeons who were attached to the hospital at that time. Among them was the late Dr. Maurice Richardson who, after looking at his hand, pulled out an old wallet from his hip pocket, held it in his hand before the fluoroscope and remarked, "I think that I can see more in this than I had realized," still holding the purse. We laughed, of course, thinking that he was referring to the amount of cash in coins in the purse, but I have since wondered if he were not looking much farther ahead than we realized at the time.

FRANK T. WOODBURY, M.D.
21 Chestnut Street
Wakefield, Massachusetts

NOTICES

ANNOUNCEMENTS

Dr. Herman Beigelman announces his return from military service and the reopening of his office for the practice of medicine at 139 Washington Street, Weymouth.

Dr. Joseph Factor, having returned from military service, is resuming the practice of obstetrics and gynecology at 45 Bay State Road, Boston.

Dr. Joseph A. Famiglietti announces his return from military service and the opening of his office for the general practice of medicine at 56 Saratoga Street, East Boston.

Dr. Roy E. Mabrey announces his return to the practice of surgery at 270 Commonwealth Avenue, Boston.

Dr. Louis Zetzel, having returned from military service, announces the reopening of his office at 53 Bay State Road, Boston, for the practice of internal medicine and gastroenterology.

HARVARD MEDICAL ALUMNI ASSOCIATION

The annual meeting and dinner of the Harvard Medical Alumni Association will be held at the Sir Francis Drake Hotel, San Francisco, on July 3, during the period when the annual meeting of the American Medical Association is in session.

MASSACHUSETTS MEDICO-LEGAL SOCIETY

The annual meeting of the Massachusetts Medico-Legal Society will be held at the Hotel Statler, Boston, on Wednesday, May 22, at 2:00 p.m.

PROGRAM

Report of Secretary.
Report of Treasurer.
Unfinished Business.
New Business:
- Report of Nominating Committee, Dr. Brickley, chairman.
- Election of Officers.
- Nomination of Standing Committee.
- Election of New Members.

Scientific Program:
- Delayed Death after Gunshot Wound of Heart. Dr. C. H. Keene.
- Atypical Case of Suicide. Dr. Richard Fort.
- Fatal Spinal-Cord Injury without Fracture or Demonstrable Dislocation of Spine. Dr. I. W. Richardson.
- An Unusual Case of "Walking Pneumonia." Dr. P. H. Leavitt.

(*Notices continued on page xv*)